

WE CLAIM:

1. A process for separating suspended material from a fluid, comprising:

a) adding at least one coagulant and/or at least one flocculant to said fluid to form a mixed fluid;

5 b) adding buoyant media to the mixed fluid;

c) directing the mixed fluid to a flotation chamber and separating the suspended material and buoyant media from the mixed fluid by flotation, resulting in floating sludge being formed in an upper portion of the flotation chamber and clarified fluid formed in a lower portion of the flotation chamber;

d) removing the floating sludge from the flotation chamber; and

15 e) removing clarified fluid from the lower portion of the flotation chamber.

2. The process of claim 1 in which a portion of the clarified fluid is recycled to the flotation chamber.

3. The process of claim 1 in which at least a portion of the buoyant media is removed from the floating sludge and is recycled for reuse in the process.

4. The process of claim 1 in which the buoyant media are finely divided solids with a specific gravity less than 1.0.

5. The process of claim 1 in which the buoyant media are solids provided with internal voids.

6. The process of claim 1 additionally comprising introducing a gas to the mixed fluid in a lower portion of the flotation chamber in step c).

7. The process of claim 6 wherein the gas is dissolved air.

8. A process for clarifying fluid containing suspended material, comprising:

- a) adding a coagulant and a flocculant to fluid to form a mixed fluid;
- b) adding buoyant media to the mixed fluid;
- c) directing the mixed fluid to a lower portion of a flotation chamber;
- d) separating the suspended material, coagulant, flocculant and buoyant media from the mixed fluid by flotation;
- e) removing the floating sludge from an upper portion of the flotation chamber;
- f) removing at least a portion of the buoyant media from the floating sludge;
- g) recycling at least a portion of the buoyant media to the process in step b) above; and
- h) removing clarified fluid from the lower portion of the flotation chamber.

9. The process of claim 8 in which the buoyant media are finely divided solids with a specific gravity less than 1.0.

10. The process of claim 8 in which the buoyant media are solids provided with internal voids.

11. The process of claim 8 including in step c) the further step of passing the mixed fluid along an upwardly directed baffle in the flotation chamber.

12. A system for fluid clarification comprising:
a mixing chamber;
a flocculation chamber in fluid communication with the mixing chamber;

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a flotation chamber in fluid communication with the flocculation chamber; and

a buoyant media recovery unit in fluid communication with the flotation chamber and with the flocculation chamber.

13. The system of claim 12 further comprising a flotation assistance device in fluid communication with the flotation chamber.

14. The system of claim 12 in which the flotation chamber contains lamella plates.

15. The system of claim 12 in which the flotation chamber contains tubes.

16. The system of claim 12 including a baffle in the flotation chamber to direct entering mixed fluid upward.

17. The system of claim 12 in which the flotation chamber contains immersed membranes.

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